LISTING OF CLAIMS

This listing of claims replaces all prior versions, and listings, of claims in the application.

Claims 1-8 (Cancelled).

9.   (Withdrawn) A method of regulating a speed of a motor in a pump, the pump connected to a water distribution system, the method comprising:

measuring an actual pressure in the water distribution system;

determining whether the actual pressure is less than, greater than, or equal to a constant pressure setpoint;

subtracting the actual pressure from a desired pressure to determine a pressure error if the actual pressure is less than or greater than the constant pressure setpoint;

determining an integral of the pressure error;

multiplying the integral by an integral gain to determine a first value;

multiplying the pressure error by a proportional gain to determine a second value;

summing the first value and the second value; and

generating an updated speed control command based on the sum of the first value and the second value.

10.   (Withdrawn) The method of claim 9 and further comprising measuring the actual pressure between the pump and a water tank.

11.   (Withdrawn) The method of claim 9 and further comprising generating an updated speed control command that includes a pulse-width modulated signal.

12.   (Withdrawn) The method of claim 9 and further comprising generating an updated speed control command that includes a space vector pulse-width modulated signal.

13.   (Withdrawn) The method of claim 9 and further comprising generating the updated speed control command in real-time.

14.   (Withdrawn) The method of claim 9 and further comprising generating an updated speed control command that includes a motor drive frequency.

15.   (Withdrawn) The method of claim 9 and further comprising determining whether the actual pressure is greater than a high band pressure or less than a low band pressure.

16.   (Withdrawn) The method of claim 15 and further comprising generating an updated speed control command when the actual pressure is less than the low band pressure.

17.   (Withdrawn) The method of claim 15 and further comprising generating an updated speed control command until the actual pressure is greater than the high band pressure.

18.   (Withdrawn) The method of claim 9 and further comprising generating a motor command including the updated speed control command and a minimum calibrated speed value.

19.   (Withdrawn) The method of claim 9 and further comprising measuring an actual pressure in a water distribution system connected to at least one of a well pump system, a municipal water system, a pool system, a spa system, a recreational vehicle water system, a marine craft water system, a turf or irrigation system, and a pressure booster system.

20.   (Currently Amended) A method of operating a motor of a pump, the method comprising:

measuring a <u>DC</u> bus current being provided to the motor <u>as an AC current by at least one</u> <u>drive</u>;

determining whether the <u>DC</u> bus current is greater than a limp current limit setting;

reducing at least one of an output voltage provided to the motor and an operating frequency of the motor if the <u>DC</u> bus current is greater than the limp current limit setting in order to drive the motor in a limp mode; and

shutting down the motor if the motor does not operate within operational limits while being driven in the limp mode.

21.   (Original) The method of claim 20 and further comprising driving the motor in the limp mode without generating a fault condition code.

22.   (Original) The method of claim 21 and further comprising generating the fault condition code while shutting down the motor.

23.   (Original) The method of claim 20 and further comprising indicating to a user that the motor is operating in the limp mode.

24.   (Currently Amended) A method of operating a motor of a pump, the method comprising:

measuring a <u>DC</u> bus voltage being provided to the motor <u>as an AC voltage by at least one</u> <u>drive</u>;

determining whether the <u>DC</u> bus voltage is less than a programmed threshold;

reducing at least one of an output voltage provided to the motor and an operating frequency of the motor if the bus voltage is less than the programmed threshold in order to drive the motor in a limp mode; and

shutting down the motor if the motor does not operate within operational limits while being driven in the limp mode.

25.   (Original) The method of claim 24 and further comprising driving the motor in the limp mode without generating a fault condition code.

26.   (Original) The method of claim 25 and further comprising generating the fault condition code while shutting down the motor.

27.   (Original) The method of claim 24 and further comprising indicating to a user that the motor is operating in the limp mode.

28.   (Currently Amended) A method of operating a motor of a pump, the method comprising:

measuring a an AC line current;

determining whether the AC line current is greater than a programmed threshold;

reducing at least one of an output voltage provided to the motor and an operating frequency of the motor if the AC line current is less than the programmed threshold in order to drive the motor in a limp mode; and

shutting down the motor if the motor does not operate within operational limits while being driven in the limp mode.

29.   (Original) The method of claim 28 and further comprising driving the motor in the limp mode without generating a fault condition code.

30.   (Original) The method of claim 29 and further comprising generating the fault condition code while shutting down the motor.

31.   (Original) The method of claim 28 and further comprising indicating to a user that the motor is operating in the limp mode.

32.   (Original) A method of operating a motor of a pump, the method comprising:

measuring a temperature of a heat sink;

determining whether the temperature is greater than a limp temperature limit setting;

reducing at least one of an output voltage provided to the motor and an operating frequency of the motor if the temperature is greater than the limp temperature limit setting in order to drive the motor in a limp mode; and

shutting down the motor if the motor does not operate within operational limits while being driven in the limp mode.

33.   (Original) The method of claim 32 and further comprising driving the motor in the limp mode without generating a fault condition code.

34.   (Original) The method of claim 33 and further comprising generating the fault condition code while shutting down the motor.

35.   (Original) The method of claim 32 and further comprising indicating to a user that the motor is operating in the limp mode.

36.   (Withdrawn) A method of detecting a fault condition in a motor of a pump, the method comprising:

measuring a bus voltage being provided to the motor;

generating a fault condition code if the bus voltage is greater than an upper limit or less than a lower limit;

shutting down a drive to the motor for a time period; and

restarting the drive to the motor after the time period has elapsed.

37.   (Withdrawn) The method of claim 36 and further comprising generating a fault condition code if the bus voltage is greater than about 450 volts or less than about 250 volts.

38.   (Withdrawn) The method of claim 36 and further comprising shutting down a drive to the motor for about 30 seconds.

39.   (Withdrawn) The method of claim 36 and further comprising indicating to a user that a fault condition code has been generated.

40.   (Withdrawn) A method of detecting a fault condition in a motor of a pump, the method comprising:

measuring a bus current being provided to the motor;

generating a fault condition code if the bus current is greater than a bus current upper limit setting;

shutting down a drive to the motor for a time period; and

restarting the drive to the motor after the time period has elapsed.

41.   (Withdrawn) The method of claim 40 and further comprising generating a fault condition code if the bus current is greater than about 25 amps.

42.   (Withdrawn) The method of claim 40 and further comprising shutting down a drive to the motor for about 30 seconds.

43.   (Withdrawn) The method of claim 40 and further comprising indicating to a user that a fault condition code has been generated.

44.   (Withdrawn) A method of detecting a fault condition in a motor of a pump, the method comprising:

sensing a first bus current value;

starting a timer if the first bus current value is less than a pre-set threshold;

sensing a second bus current value after a pre-set time period has elapsed;

determining whether a drive to the motor is operating at a full speed;

generating a fault condition code if the second bus current value is also less than the pre-set threshold and if the drive to the motor is operating at the full speed;

shutting down the drive to the motor for a time period; and

restarting the drive to the motor after the time period has elapsed.

45.   (Withdrawn) The method of claim 44 and further comprising sensing a second bus current value after a about one second has elapsed.

46.   (Withdrawn) The method of claim 44 and further comprising generating a fault condition code if the second bus current value is less than about 1.5 amps and if the drive to the motor is operating at the full speed.

47.   (Withdrawn) The method of claim 44 and further comprising shutting down a drive to the motor for about 30 seconds.

48.   (Withdrawn) The method of claim 44 and further comprising indicating to a user that a fault condition code has been generated.

49.   (Withdrawn) A method of detecting a fault condition in a motor of a pump, the method comprising:

sensing a first temperature value of a heat sink;

generating a fault condition code if the first temperature value is greater than a temperature upper limit;

shutting down a drive to the motor;

sensing a second temperature value of the heat sink; and

attempting to restart the drive to the motor if the second temperature value is less than a limp mode temperature limit.

50.   (Withdrawn) The method of claim 49 and further comprising sensing a first temperature of a heat sink connected to at least one of the pump, the motor, and a controller.

51.   (Withdrawn) The method of claim 49 and further comprising generating a fault condition code if the first temperature value is greater than about 70 degrees Celsius.

52.   (Withdrawn) The method of claim 49 and further comprising attempting to restart the drive to the motor if the second temperature value is less than about 60 degrees Celsius.

53.   (Withdrawn) The method of claim 49 and further comprising indicating to a user that a fault condition code has been generated.

54.   (Withdrawn) The method of claim 49 and further comprising setting the limp mode temperature limit based on an input voltage.

55.   (Withdrawn) A method of detecting a fault condition in a motor of a pump, the method comprising:

sensing a first bus current value;

sensing a speed of the motor;

incrementing a counter and setting a timer if the first bus current value is greater than a bus current upper limit and if the speed of the motor is greater than or equal to a high speed limit;

attempting to operate the motor in a reverse direction if the counter has been incremented above an increment limit within a first time period;

sensing a second bus current value while the motor is operating in the reverse direction;

operating the motor in the reverse direction for a second time period if the second bus current value is less than the bus current upper limit and attempting to operate the motor in a forward direction once the second time period has elapsed; and

generating a fault condition code and shutting down a drive to the motor if the second bus current value is greater than the bus current upper limit.

56.   (Withdrawn) The method of claim 55 and further comprising incrementing a counter and setting a timer if the first bus current value is greater than about 15 amps and if the speed of the motor is greater than or equal to a high speed limit.

57.   (Withdrawn) The method of claim 55 and further comprising attempting to operate the motor in a reverse direction if the counter has been incremented above five increments within about five minutes.

58.   (Withdrawn) The method of claim 55 and further comprising operating the motor in the reverse direction for about 30 seconds.

59.   (Withdrawn) The method of claim 55 and further comprising indicating to a user that a fault condition code has been generated.

60.   (Withdrawn) A method of detecting a fault condition in a motor of a pump, the method comprising:

sensing a first line current value;

sensing a speed of the motor;

attempting to operate the motor in a reverse direction if the first line current value is greater than a programmed threshold and if the speed of the motor is less than a motor speed low threshold;

sensing a second line current value while the motor is operating in the reverse direction;

generating a fault condition code and shutting down a drive to the motor if the second line current value is also greater than the programmed threshold; and

operating the motor in the reverse direction for a time period if the second line current value is less than the programmed threshold and attempting to operate the motor in a forward direction after the time period has elapsed.

61.   (Withdrawn) The method of claim 60 and further comprising generating a fault condition code and shutting down a drive to the motor if the second line current value is greater than about 7 amps.

62.   (Withdrawn) The method of claim 60 and further comprising operating the motor in the reverse direction for about 30 seconds.

63.   (Withdrawn) The method of claim 60 and further comprising indicating to a user that a fault condition code has been generated.

Claims 64-71 (Cancelled).

72.   (Withdrawn) A method of monitoring fault conditions occurring in a water distribution system, the method comprising:

sensing a new fault condition occurring in the water distribution system;

generating a fault condition code and incrementing a counter;

determining whether the counter has been incremented above an increment limit;

storing the new fault condition code over one of a plurality of old fault condition codes if the counter has been incremented above an increment limit;

storing the new fault condition code in a new memory location if the counter has not been incremented above an increment limit; and

retrieving the new fault condition code and the plurality of old fault condition codes.

73.   (Withdrawn) The method of claim 72 and further comprising determining whether the counter has been incremented above an increment limit of 15 fault condition codes.

74.   (Withdrawn) The method of claim 72 and further comprising storing the new fault condition code over an oldest one of the plurality of old fault condition codes if the counter has been incremented above the increment limit.

75.   (Withdrawn) The method of claim 72 and further comprising retrieving the new fault condition code and the plurality of old fault condition codes with at least one of a serial communication link and a wireless communication link.

76.   (Withdrawn) The method of claim 72 and further comprising indicating to a user a type of fault condition code of the new fault condition code.

Claims 77-86 (Cancelled).

87.   (Previously Presented) A method of operating a motor of a pump, the method comprising:

measuring a parameter including at least one of an actual pressure, a bus current, a bus voltage, a line current, a temperature of a heat sink, and a speed of the motor;

determining if the parameter is outside of a range;

executing a recovery operation if the parameter is outside of a range, the recovery operation including at least one of generating an updated speed control command, driving the motor in a limp mode, shutting down the motor and then restarting the motor, and operating the motor in a reverse direction and then operating the motor in a forward direction; and

shutting down the motor if the recovery operation fails.